Should the Examiner believe that anything further would be desirable in order to place this application in better condition for allowance, the Examiner is invited to contact Applicant's undersigned representative at the telephone number set forth below.

Respectfully submitted,

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JAO:GXL/HS

Attachment:
Appendix

Date: October 18, 2002

OLIFF & BERRIDGE, PLC
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DEPOSIT ACCOUNT USE AUTHORIZATION
Please grant any extension necessary for entry;
Charge any fee due to our Deposit Account No. 15-0461

Docket No. 110580.01

Application No. 09/916,682

APPENDIX

Changes to Specification:

Page 2, lines 22-26:

To overcome the above problems, in Japanese patent publication Laid-open No. 11(1999)-40330(A), a ceramic heater is disclosed which has a ribbon-like heat generation body formed by sintering metal particles or the like on the surface of a plate made of ~~ceramic~~ nitride ceramics or the like.

Page 3, lines 9-11:

Non-uniformity in the surface temperature as described above is more noticeable in a ~~ceramic~~ nitride ceramics material having a high heat-conductivity.

Page 3, between lines 19 and 20, including all the paragraphs inserted in the August 27, 2002 Amendment:

In order to solve the above-mentioned problem, a ceramic heater used in an industrial field of semiconductors of the first aspect of the present invention, comprises a disk-shaped ceramic substrate; and a heat-generation pattern disposed on a surface of the disk-shaped ceramic substrate, wherein said disk-shaped ceramic substrate has a thickness of 18 mm or less and the ceramic substrate is made of at least one selected from the group consisting of ~~aluminum~~ nitride ceramics and ~~ceramic~~ carbide ceramics; and the heat-generation pattern has a bending portion which describes an arc having a curvature radius within a range of 0.1 mm to 20 mm.

A ceramic heater used in an industrial field of semiconductors of the second aspect of the present invention, comprises a disk-shaped ceramic substrate; and a heat-generation pattern disposed within said disk-shaped ceramic substrate, wherein the disk-shaped ceramic substrate has a thickness of 18 mm or less and the ceramic substrate is made of at least one selected from the group consisting of ~~aluminum~~ nitride ceramics and ~~ceramic~~ carbide

ceramics; and the heat-generation pattern has a bending portion which describes an arc having a curvature radius within a range of 0.1 to 20 mm.

In these cases, the heat-generation pattern may preferably have a width within a range of 0.1 to 20 mm and may preferably be a combination of a spiral pattern and a bending pattern. Alternatively, the heat-generation pattern may preferably be a combination of a spiral pattern and a bending pattern; and the bending pattern may preferably be arranged along the outer regions of the disk-shaped ceramic substrate.

Page 7, line 21 - Page 8, line 23:

On the other hand, there is disclosed such square-shaped ceramic heater that has a bending portion which describes an arc in Japanese patent publication laid-open No. 9-289075 (A), Japanese utility model publication laid-open No. 3-19292 (A) and Japanese utility model publication laid-open No. 54-128945 (A). Disclosed in these publications, however, are not a disk-shape, thus different from the present invention. Additionally, in Japanese patent publication laid-open No. 9-82786 discloses such heater that has a space formed between a heat generation body bulk and a ceramic substrate, but its construction is different from the present invention. Because, in the case of the present invention, the ceramic substrate is united with a heat generation body. Therefore, heat is not conducted in the space, thus a temperature of a heating surface can not be uniform in this case, different from the present invention. Additionally, in Japanese patent publication No. 53-6936 (A), such electric instrument is disclosed that is provided with a heat generation body on one surface of the ceramic heat plate. This instrument, however, is applied for a microwave oven and an electric heater. Under the consideration of the influence to human and reactivity of ceramic, material of the instrument is limited to such material as to be impervious to water and to be innoxious, namely, the material is limited to ~~ceramic~~ oxide ceramics, such as alumina, silica. It is obvious that ~~ceramic~~ nitride ceramics and ~~ceramic oxide~~ carbide

ceramics can not be applied for the instrument although they can be applied for the present invention. ~~ceramic oxide~~ Oxide ceramics is not excellent in the temperature responsiveness (it takes time to make a temperature rise even if it is heated).

Page 11, lines 18-26:

In these figures, the ceramic heater 100 comprises a plate-shaped ceramic substrate 1 made of insulating material, such as ~~ceramic~~ nitride ceramics or ~~ceramic~~ carbide ceramics. The ceramic heater 100 is constructed as following so that a silicon wafer or the like may be heated: on a principal plain of the ceramic heater 100, as shown in Fig. 1, there is formed a heat generation body pattern 2 which has a predetermined width and a flat cross section; another principal plane of the ceramic heater 100 is for placing a silicon wafer or the like.

Page 14, lines 17-22:

Here, said ceramic substrate preferably be of a sintered aluminum nitride material. Although, the material used for the ceramic substrate is not limited to aluminum nitride, indeed ~~ceramic~~ carbide ceramics, ~~ceramic~~ oxide ceramics, ~~ceramic~~ nitride ceramics other than aluminum nitride, and the like may also be preferred.

Page 14, line 24 - Page 15, line 6:

Some examples of ~~ceramic~~ carbide ceramics include the metal ~~ceramic~~ carbide ceramics materials, such as silicon carbide, zirconium carbide, titanium carbide, tantalum carbide and tungsten carbide. Some examples of ~~ceramic~~ oxide ceramics include the metal ~~ceramic~~ oxide ceramics materials such as alumina, zirconia, cordierite and mullite. Further, some examples of ~~ceramic~~ nitride ceramics include the metal ~~ceramic~~ nitride ceramics materials, besides aluminum nitride, such as silicon nitride, boron nitride, titanium nitride.

Page 15, lines 8-12:

Among these ceramic materials, in general, ~~ceramic~~ nitride ceramics and ~~ceramic~~ carbide ceramics are preferred to ~~ceramic~~ oxide ceramics in that the former materials exhibit

higher heat conductivity. Here, these materials may be used alone or in combination of two or more materials.

Page 15, lines 14-16:

For example, ~~ceramic~~ oxide ceramics and/or ~~ceramic~~ carbide ceramics may be added to ~~ceramic~~ nitride ceramics, alternatively, ~~ceramic~~ oxide ceramics and/or ~~ceramic~~ carbide ceramics may be added to ~~ceramic carbide~~ nitride ceramics.

Page 21, lines 5-7:

Particularly, in the case of ~~ceramic~~ carbide ceramics, if a purity is low, then it shows electric conductivity, therefore, an insulating film may be formed thereon.

Page 22, lines 13-20:

Next, the ceramic substrate was immersed in an electroless nickel plating bath comprising aqueous solutions at concentrations of 80 g/l of nickel sulfate, 24 g/l of sodium ~~phosphate~~hypophosphite, 12 g/l of sodium acetate, 8 g/l of boric acid and 6 g/l of ammonium chloride in order to deposit a metal coating layer of nickel having 1 mm thickness on the surface of the silver-lead sintered body thereby forming a heat generation body pattern.

Page 24, lines 8-10:

(1) Firstly, a ceramic powder, such as ~~ceramic~~ nitride ceramics or ~~ceramic~~ carbide ceramics, binder and solvent were mixed to prepare a green sheet.

Page 29, lines 2-10:

Samples of Examples 1 to 8 were prepared as following: four kinds of heat generation patterns were formed on the ceramic substrate which is made of aluminum nitride or silicon carbide, with varying the curvatures of bending~~four kinds of heat generation patterns made of aluminum nitride and silicon carbide respectively were formed on the ceramic substrate, with varying respective curvatures of bending patterns~~. Samples of Examples 9 to 16 were prepared as following: ~~four kinds of heat generation patterns made of the aluminum nitride~~

~~ceramic and the silicon carbide ceramic respectively were formed inside the ceramic substrate, with varying respective curvatures of bending patterns~~four kinds of heat generation patterns were formed inside the ceramic substrate which is made of aluminum nitride or silicon carbide, with varying the curvatures of bending.

Page 29, lines 12-24:

Samples of Comparative Examples 1 to 4 were prepared as following: heat generation patterns having a bending pattern of an approximate right angle as shown in Fig. 6 were formed on or inside the ceramic substrate which is made of aluminum nitride or silicon carbide~~heat generation patterns having a bending pattern of an approximate right angle as shown in Fig. 6, made of aluminum nitride and silicon carbide respectively, were formed on or inside the ceramic substrate~~. In addition, for other comparative examples, samples of Reference examples 1 to 4 were prepared as following: heat generation patterns having a bending pattern which describes an arc having a curvature radius of 25 mm were formed on or inside the ceramic substrate which is made of aluminum nitride or silicon carbide ~~heat generation patterns having a pattern which describes an arc having a curvature radius of 25 mm, made of aluminum nitride and silicon carbide respectively, were formed on or inside the ceramic substrate~~. Furthermore, samples of Reference examples 5 to 16 were prepared as following: heat generation patterns were formed on or inside the ceramic substrate which is made of alumina~~heat generation patterns made of alumina substrate, were formed on and/or inside the ceramic substrate~~.

Changes to Claims:

The following is a marked-up version of the amended claim(s):

1. (Twice Amended) A ceramic heater used in an industrial field of semiconductors, comprising:

a disk-shaped ceramic substrate; and

a heat-generation pattern disposed on a surface of said disk-shaped ceramic substrate,

wherein said disk-shaped ceramic substrate has a diameter of 200 mm or more ~~thickness of 18 mm or less~~ and said disk-shaped ceramic substrate is made of at least one selected from a group essentially consisting of ~~aluminum~~ nitride ceramics and ~~ceramic~~ carbide ceramics; and

said heat-generation pattern has a bending portion which describes an arc having a curvature radius within a range of 0.1 mm to 20 mm.

2. (Twice Amended) A ceramic heater used in an industrial field of semiconductors, comprising:

a disk-shaped ceramic substrate; and

a heat-generation pattern disposed within said disk-shaped ceramic substrate,

wherein said disk-shaped ceramic substrate has a diameter of 200 mm or more ~~thickness of 18 mm or less~~ and said disk-shaped ceramic substrate is made of at least one selected from a group essentially consisting of ~~aluminum~~ nitride ceramics and ~~ceramic~~ carbide ceramics; and

said heat-generation pattern has a bending portion which describes an arc having a curvature radius within a range of 0.1 to 20 mm.